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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/199,829	11/25/1998	PATRICIA B. SMITH	TI-25250	4119
23494	7590	05/04/2004	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265			MALDONADO, JULIO J	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 05/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application N .

09/199,829

Applicant(s)

SMITH ET AL.

Examiner

Julio J. Maldonado

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 23 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,6,25,28,29 and 31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,6,25,28,29 and 31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. The cancellation of claims 2-5, 7-24, 26, 27 and 30 is acknowledged.
2. Claims 1, 6, 25, 28, 29 and 31 are pending in the application

#### ***Continued Examination Under 37 CFR 1.114***

3. A request for continued examination under 37 CFR 1.114 was filed in this application after a decision by the Board of Patent Appeals and Interferences, but before the filing of a Notice of Appeal to the Court of Appeals for the Federal Circuit or the commencement of a civil action. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 01/23/2004 has been entered.

#### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1, 6, 25, 28, 29 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akram et al. (U.S. 5,578,526) in view of Irving et al. (U.S. 3,837,856).

In reference to claims 1, 25 and 29, Akram et al. (herein referred to as Akram) shows, in an analogous art related to fabrication multi chip modules, in Figures 1A-1D providing a semiconductor wafer (12) containing oxygen sensitive material; forming a

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layer of a first material (16) over the oxygen sensitive material; forming a photoresist layer (18) over the layer of the first material; patterning the layer of the first material; and removing all of the photoresist layer after patterning the layer of the first material using a "piranha" etch (column 4, line 55 - column 5, line 22).

Akram does not show wherein the photoresist layer is removed using a downstream plasma process including hydrogen or deuterium and substantially no oxidizing component.

Irving teaches that photoresist may be removed from a substrate using a downstream plasma process including hydrogen or deuterium and substantially no oxidizing component. Irving further teaches wherein the aforementioned downstream plasma process is preferable compared to wet etch type photoresist removal processes because photoresist wet etch removal solutions decompose rapidly and thus require frequent changes (column 2, line 15 - column 4, line 28).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to remove the photoresist of Akram using the method as described by Irving since the "piranha" etch used in Akram is a well known photoresist wet etch removal solution that decomposes frequently and, as evidenced by Irving, the downstream plasma process of Irving is a well known photoresist removal method which can overcome the problems associated with wet etchant photoresist removal systems (column 1, lines 29 – 67).

The combined teachings of Akram and Irving also disclose that the layer of first material is oxygen sensitive material (Akram, column 4, line 55 - column 5, line 22) but

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fail to teach removing residue on the semiconductor wafer after removing the photoresist layer using a downstream plasma process including hydrogen or deuterium and substantially no oxidizing component. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made, in light of the fact that the downstream plasma process of Irving, in the invention of Akram in view of Irving removes all of the photoresist (Irving, column 3, line 66 – column 4, line 2), any and all residues remaining from any impartial removal of the photoresist layer would also have been removed.

Furthermore, the combined teachings of Akram and Irving teach that the downstream plasma process may include gases such as any one of hydrogen and nitrogen (Irving, column 3, lines 11-14). Furtherstill, the combined teachings of Akram and Irving teach that the temperature range required in removing the photoresist material while using nitrogen gas is in excess of 200 °C while the temperature range required in removing the photoresist material while using hydrogen gas is in the range between 100° and 120 °C (Irving, column 4, lines 9-21).

Akram in view of Irving does not disclose wherein the removing the photoresist layer is performed in a temperature range of 245° to 350 °C. It would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the downstream plasma photoresist removal process of Akram in view of Irving at a temperature range of 245° to 350 °C since, as evidenced by Irving, a combination of gases may be used and, with each different gas used, a different photoresist removal temperature range is appropriate. Thus, by applying a proper combination of

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downstream plasma photoresist removal gases, it would have been obvious to one of ordinary skill in the art to expect the discovery of a photoresist removal temperature within a range of 245° to 350 °C and the discovery of the optimum or workable ranges of a process temperature would have involved only routine skill in the art. Furthermore, the specification contains no disclosure of either the critical nature of the claimed process temperature or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen temperature ranges or upon another variable recited in a claim, the applicant must show that the particular temperature ranges are critical.

In re claims 6, 28, and 31, Irving shows wherein downstream plasma process further includes a gas made of argon, nitrogen, and any other inert gas (column 3, line 10 - column 4, line 38).

### ***Response to Arguments***

6. Applicant's arguments filed 01/23/2004 have been fully considered but they are not persuasive.

In response to applicants arguments about the prior art of record lacking a temperature range of 105°C to 350°, as mentioned above, the specification contains no disclosure of either the critical nature of the claimed process temperature or any unexpected results arising therefrom. Therefore, the selection of the temperature range is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species.

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***Conclusion***

7. Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is 571-272-2800. See MPEP 203.08.

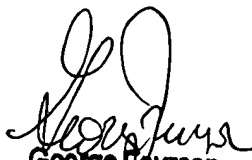
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Julio J. Maldonado whose telephone number is (571) 272-1864. The examiner can normally be reached on Monday through Friday.

9. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (571) 272-1855. The fax number for this group is 703-872-9306 for before final submissions, 703-872-9306 for after final submissions and the customer service number for group 2800 is (703) 306-3329.

Updates can be found at <http://www.uspto.gov/web/info/2800.htm>.

Julio J. Maldonado  
Patent Examiner  
Art Unit 2823

Julio J. Maldonado  
April 29, 2004

  
George Fourson  
Primary Examiner